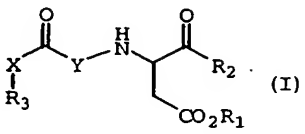
What Is Claimed Is:

1. A compound having the Formula I:



(I)

or pharmaceutically acceptable salts or prodrugs thereof, wherein:

R_1 is an optionally substituted alkyl or hydrogen;

R_2 is hydrogen or optionally substituted alkyl;

R_3 is an alkyl, saturated carbocyclic, partially saturated carbocyclic, aryl, saturated heterocyclic, partially saturated heterocyclic or heteroaryl group, wherein said group is optionally substituted;

X is O, S, NR_4 or $(CR_4R_5)_n$, where R_4 and R_5 are, at each occurrence, independently selected from the group consisting of hydrogen, alkyl and cycloalkyl, and n is 0, 1, 2 or 3; or

X is NR_4, and R_3 and R_4 are taken together with the nitrogen atom to which they are attached to form a saturated heterocyclic, partially saturated heterocyclic or heteroaryl group, wherein said group is optionally substituted; or

X is CR_4R_5, and R_3 and R_4 are taken together with the carbon atom to which they are attached to form a saturated carbocyclic, partially saturated carbocyclic, aryl, saturated heterocyclic, partially saturated heterocyclic or oxygen-containing heteroaryl group, wherein said group is optionally substituted; and

Y is a residue of a natural or non-natural amino acid;

provided that when X is O, then R_3 is not unsubstituted benzyl or *t*-butyl; and when X is CH_2, then R_3 is not hydrogen.

2. The compound of claim 1, wherein R_1 is hydrogen, methyl, ethyl or acetoxymethyl.

3. The compound of claim 1, wherein R_2 is hydrogen, fluoromethyl, acyloxymethyl, arylacyloxymethyl, aryloxymethyl, phosphinyloxymethyl, or aminomethyl.

4. The compound of claim 1, wherein Y is valine, isoleucine, leucine, alanine, phenylalanine, cyclohexylalanine, 2-aminobutyric acid, phenylglycine or cyclohexylglycine.

5. The compound of claim 1, wherein:
R_3 is optionally substituted alkyl, C_4-C_7 cycloalkyl, saturated heterocyclic, partially saturated heterocyclic, aryl or heteroaryl; and
X is O, S, NR_4 or $(CR_4R_5)_n$, wherein R_4 and R_5 are independently hydrogen, alkyl or cycloalkyl, and n is 0, 1, 2 or 3.

6. The compound of claim 1 , wherein X is O, NH or CH_2.

7. The compound of claim 1, wherein R_3 is straight-chained or branched C_{1-6} alkyl.

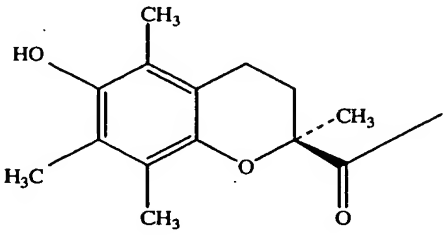
8. The compound of claim 1, wherein R_3 is straight-chained or branched C_{1-6} alkyl optionally substituted by hydroxy, carboxy, halogen, C_4-C_7 cycloalkyl, saturated or unsaturated heterocyclic group, aryl or heteroaryl.

9. The compound of claim 1, wherein R_3 is optionally substituted benzyl.

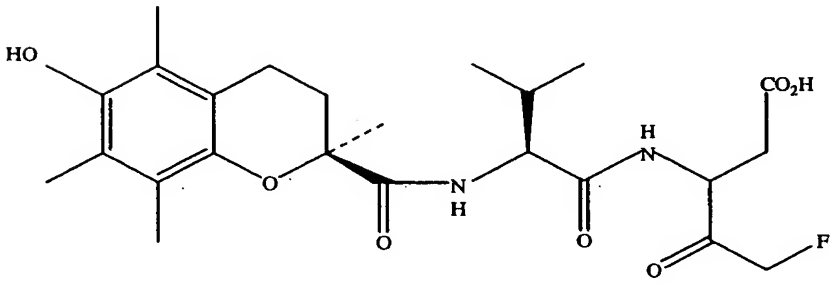
10. The compound of claim 1, wherein R_3 is optionally substituted pyridylmethyl.

11. The compound of claim 1, wherein R_3–X–C(O)– is an antioxidant group.

12. The compound of claim 11, wherein said antioxidant group is

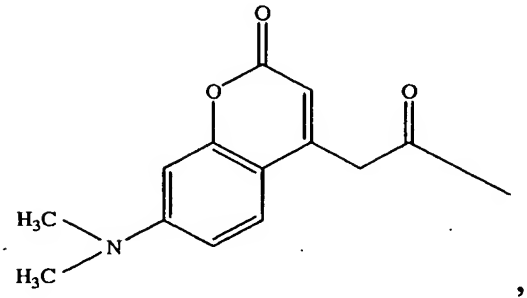


13. The compound of claim 12, wherein said compound is



14. The compound of claim 1, wherein R_3–X–C(O)– is a fluorescent group.

15. The compound of claim 14, wherein said fluorescent group is



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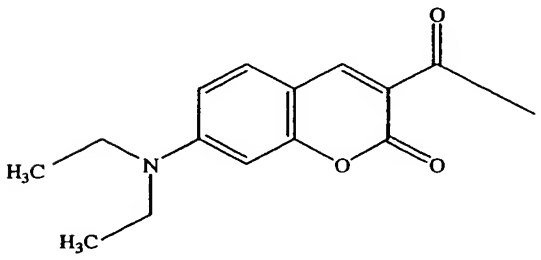

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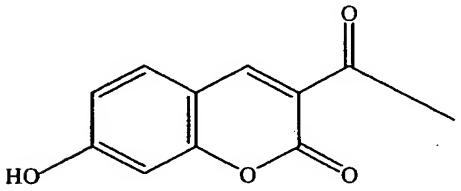

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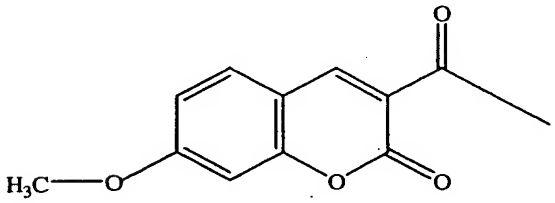

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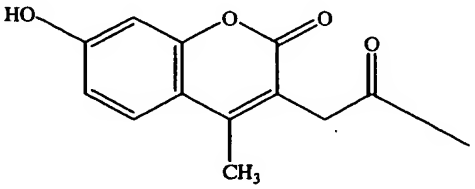
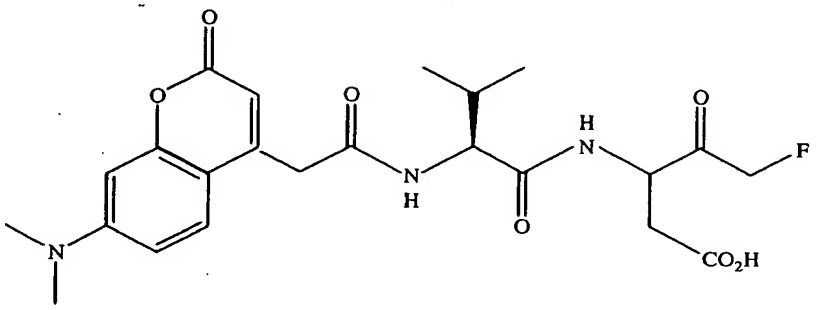


16. The compound of claim 14, wherein said compound is selected from the group consisting of



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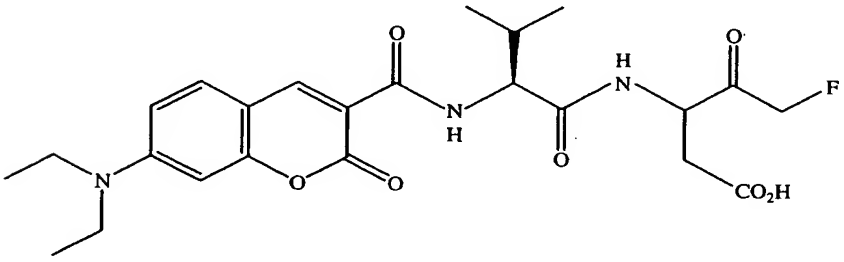

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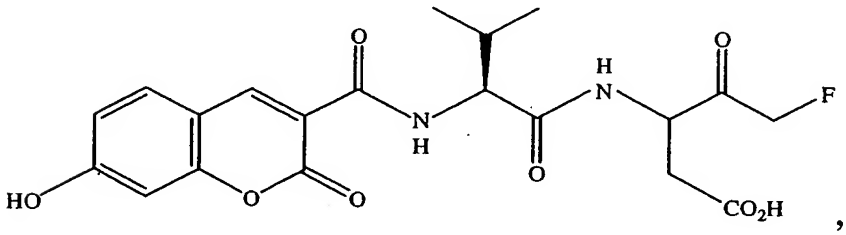

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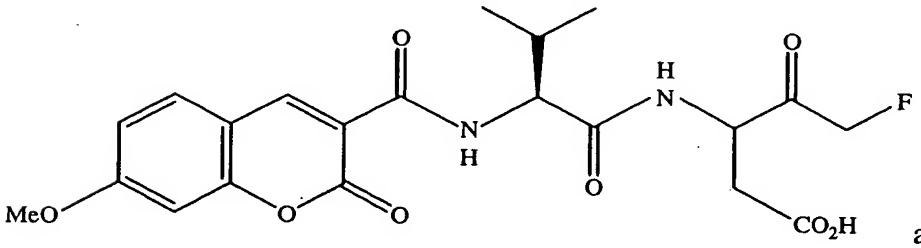
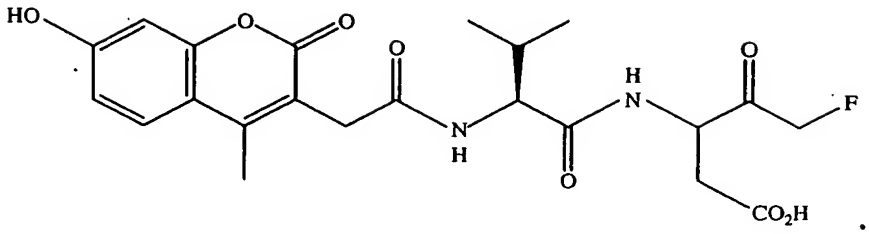
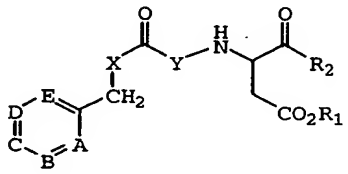


and



17. A compound having the Formula II:



(II)

or pharmaceutically acceptable salts or prodrugs thereof wherein:

R_1 is an optionally substituted alkyl or hydrogen;

R_2 is hydrogen or optionally substituted alkyl;

X is O, S, NR_4 or $(CR_4R_5)_n$, wherein R_4 and R_5 are, at each occurrence, independently selected from the group consisting of hydrogen, alkyl, and cycloalkyl, and n is 0, 1, 2 or 3;

Y is a residue of a natural or non-natural amino acid;

A is CR_6 or nitrogen;

B is CR_7 or nitrogen;

C is CR_8 or nitrogen;

D is CR_9 or nitrogen;

E is CR_{10} or nitrogen; provided that not more than three of A, B, C, D and E are nitrogen; and R_6-R_{10} independently are hydrogen, halo, C_1-C_6 haloalkyl, C_6-C_{10} aryl, C_4-C_7 cycloalkyl, C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_6-C_{10} aryl(C_1-C_6)alkyl, C_6-C_{10} aryl(C_2-C_6)alkenyl, C_6-C_{10} aryl(C_2-C_6)alkynyl, C_1-C_6 hydroxyalkyl, nitro, amino, cyano, C_1-C_6 acylamino, hydroxy, C_1-C_6 acyloxy, C_1-C_6 alkoxy, alkylthio, or carboxy; or

one of R_6 and R_7, or R_7 and R_8, or R_8 and R_9, or R_9 and R_{10} are taken together with the carbon atoms to which they are attached to form a carbocycle or heterocycle, selected from the group consisting of —OCH_2O—, —OCF_2O—, —$(CH_2)_3$—, —$(CH_2)_4$—, —OCH_2CH_2O—, —$CH_2N(R_{13})CH_2$—, —$CH_2CH_2N(R_{13})CH_2$—, —$CH_2N(R_{13})CH_2CH_2$—, –$N(R_{13})$–CH=CH–, -CH=CH–$N(R_{13})$–, –O–CH=CH–, –CH=CH–O–, –S–CH=CH–, –CH=CH–S–, –N=CH–CH=CH–, –CH=N–CH=CH–, –CH=CH–N=CH–, –CH=CH–CH=N–, –N=CH–CH=N–, and —CH=CH—CH=CH—; wherein R_{13} is hydrogen, alkyl or cycloalkyl;

provided that when X is O, A is CR_6, B is CR_7, C is CR_8, D is CR_9 and E is CR_{10}, then at least one of the R_6-R_{10} is not hydrogen.

18. The compound of claim 17, wherein R_2 is hydrogen, fluoromethyl, acyloxymethyl, arylacyloxymethyl, aryloxymethyl, phosphinyloxymethyl, or aminomethyl.

19. The compound of claim 17, wherein R_1 is hydrogen, methyl, ethyl or acetoxymethyl.

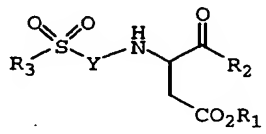
20. The compound of claim 17, wherein Y is valine, isoleucine, leucine, alanine, phenylalanine, cyclohexylalanine, 2-aminobutyric acid, phenylglycine or cyclohexylglycine.

21. The compound of claim 17, wherein X is O, A is CR_6, B is CR_7, C is CR_8, D is CR_9, and E is CR_{10}.

22. The compound of claim 17, wherein X is O, and one of A, B, C, D or E is nitrogen.

23. The compound of claim 17, wherein X is CH_2, A is CR_6, B is CR_7, C is CR_8, D is CR_9 and E is CR_{10}.

24. A compound having the Formula III:



(III)

or pharmaceutically acceptable salts or prodrugs thereof, wherein:

R_1 is an optionally substituted alkyl or hydrogen;

R_2 is hydrogen or optionally substituted alkyl;

R_3 is an alkyl, saturated carbocyclic, partially saturated carbocyclic, aryl, saturated heterocyclic, partially saturated heterocyclic or heteroaryl group, wherein said group is optionally substituted; and

Y is a residue of a natural or non-natural amino acid.

25. The compound of claim 24, wherein R_1 is hydrogen, methyl, ethyl or acetoxymethyl.

26. The compound of claim 24, wherein R_2 is hydrogen, fluoromethyl, acyloxymethyl, arylacyloxymethyl, aryloxymethyl, phosphinyloxymethyl, or aminomethyl.

27. The compound of claim 24, wherein Y is valine, isoleucine, leucine, alanine, phenylalanine, cyclohexylalanine, 2-aminobutyric acid, phenylglycine or cyclohexylglycine.

28. The compound of claim 24, wherein R_3 is straight-chained or branched C_{1-6} alkyl.

29. The compound of claim 24, wherein R_3 is straight-chained or branched C_{1-6} alkyl optionally substituted by hydroxy, carboxy, halogen C_4-C_7 cycloalkyl, saturated or unsaturated heterocyclic group, aryl or heteroaryl.

30. The compound of claim 24, wherein R_3 is methylphenyl or dimethylaminonaphthyl.

31. The compound of claim 1, wherein said compound is selected from the group consisting of:

2-Chlorobenzyloxycarbonyl-Val-Asp-fmk,
3-Chlorobenzyloxycarbonyl-Val-Asp-fmk,
4-Chlorobenzyloxycarbonyl-Val-Asp-fmk,
Phenethoxycarbonyl-Val-Asp-fmk,
Cyclohexylmethoxycarbonyl-Val-Asp-fmk,
Methoxycarbonyl-Val-Asp-fmk,
Ethoxycarbonyl-Val-Asp-fmk,
Isopropyloxycarbonyl-Val-Asp-fmk,
2-Chlorobenzyloxycarbonyl-Ile-Asp-fmk,
3-Chlorobenzyloxycarbonyl-Ile-Asp-fmk,
4-Chlorobenzyloxycarbonyl-Ile-Asp-fmk,
Phenylacetyl-Val-Asp-fmk,
4-Nitrobenzyloxycarbonyl-Val-Asp-fmk,
2,5-Dimethylbenzyloxycarbonyl-Val-Asp-fmk,
3,4-Dichlorobenzyloxycarbonyl-Val-Asp-fmk,
3,5-Dichlorobenzyloxycarbonyl-Val-Asp-fmk,
2,5-Dichlorobenzyloxycarbonyl-Val-Asp-fmk,
2,6-Dichlorobenzyloxycarbonyl-Val-Asp-fmk,

2,4-Dichlorobenzyloxycarbonyl-Val-Asp-fmk,
2,4-Dimethylbenzyloxycarbonyl-Val-Asp-fmk,
4-Ethylbenzyloxycarbonyl-Val-Asp-fmk,
4-Bromobenzyloxycarbonyl-Val-Asp-fmk,
4-Fluorobenzyloxycarbonyl-Val-Asp-fmk,
Cyclopentylmethoxycarbonyl-Val-Asp-fmk,
4-Trifluoromethylbenzyloxycarbonyl-Val-Asp-fmk,
3-Phenylpropionyl-Val-Asp-fmk,
Benzylaminocarbonyl-Val-Asp-fmk,
3-Phenylpropyloxycarbonyl-Val-Asp-fmk,
2,4-Difluorobenzyloxycarbonyl-Val-Asp-fmk,
3,4-Difluorobenzyloxycarbonyl-Val-Asp-fmk,
4-Morpholinecarbonyl-Val-Asp-fmk,
4-Pyridylmethoxycarbonyl-Val-Asp-fmk,
2-Pyridylmethoxycarbonyl-Val-Asp-fmk,
2,6-Dichlorobenzyloxycarbonyl-Val-Asp-DCB-methylketone,
Isobutoxycarbonyl-Val-Asp-fmk,
Propionyl-Val-Asp-fmk,
Benzyl-glutaryl-Val-Asp-fmk,
Glutaryl-Val-Asp-fmk,
3-(2-Phenyloxyphenyl)propionyl-Val-Asp-fmk,
3-(5-Bromo-2-hydroxyphenyl)propionyl-Val-Asp-fmk,
3-Fluorobenzyloxycarbonyl-Val-Asp-fmk,
2-Fluorobenzyloxycarbonyl-Val-Asp-fmk,
3-Methylbenzyloxycarbonyl-Val-Asp-fmk,
2-Chloro-4-fluorobenzyloxycarbonyl-Val-Asp-fmk, and
2-Naphthylmethoxycarbonyl-Val-Asp-fmk.

32. The compound of claim 24, wherein said compound is selected from the group consisting of:

p-Toluenesulfonyl-Val-Asp-fmk, and

p-Toluenesulfonyl-Phe-Asp-fmk.

33. A pharmaceutical composition, comprising a compound of claim 1, 17 or 24, and a pharmaceutically acceptable carrier.

34. A method of inhibiting cell death of a cell or tissue, comprising contacting said cell or tissue with an effective amount of a compound of claim 1, 17 or 24.

35. A method of treating or ameliorating cell death in the central or peripheral nervous system, retinal neurons, cardiac muscle or immune system cells of an animal, comprising administering to the animal in need of such treatment or ameliorating an effective amount of a compound of claim 1, 17 or 24.

36. The method of claim 35, wherein said cell death is in the central or peripheral nervous system, and is due to one of:

(a) a condition of ischemia and excitotoxicity selected from the group consisting of focal ischemia due to stroke and global ischemia due to cardiac arrest;

(b) traumatic injury;

(c) viral infection;

(d) radiation-induced nerve cell death;

(e) a neurodegenerative disorder selected from the group consisting of Alzheimer's disease, Parkinson's Disease, a prion disease, multiple sclerosis, amyotrophic lateral sclerosis, and spinobulbar atrophy;

(f) spinal cord injury; or

(g) acute bacterial meningitis.

37. The method of claim 35, wherein said cell death is in the central or peripheral nervous system, and is due to expansion of trinucleotide repeats of specific genes.

38. The method of claim 35, wherein said cell death is due to Huntington's Disease.

39. The method of claim 35, wherein said cell death is in cardiac muscle tissue, and is due to myocardial infarction, congestive heart failure, cardiomyopathy or viral infection of the heart.

40. The method of claim 35, wherein said cell death is in retinal neurons and is due to increased intraocular pressure, age-related macular degeneration or retinitis pigmentosa.

41. The method of claim 35, wherein said cell death is in the immune system, and is due to an immune deficiency disorder selected from the group consisting of acquired immune deficiency syndrome, severe combined immune deficiency syndrome and radiation-induced immune suppression.

42. The method of claim 35, wherein said cell death is due to an autoimmune disorder selected from the group consisting of lupus erythematosus, rheumatoid arthritis and type I diabetes.

43. The method of claim 42, wherein said cell death is due to type I diabetes.

44. A method of treating or preventing polycystic kidney disease, renal amyloidosis, acute renal failure, cyclosporine A induced tubular epithelial cell death, hypoxia-induced necrosis of renal proximal tubules, HIV-

induced nephropathy or anemia/erythropoiesis in an animal, comprising administering to the animal in need of such treatment an effective amount of a compound of claim 1, 17 or 24.

45. A method of protecting a mammalian organ or tissue from cell death due to deprivation of normal blood supply, comprising contacting said organ or tissue with an effective amount of a compound of claim 1, 17 or 24.

46. The method of claim 45, wherein said organ or tissue is present in a storage medium prior to transplant into a mammal.

47. The method of claim 45, wherein said tissue is embryonic nigral tissue.

48. The method of claim 45, wherein said contacting comprises infusion of said compound into the organ or tissue, or bathing of said organ or tissue in a storage medium which comprises said compound.

49. A method of reducing or preventing cell death in a donor organ or tissue after it has been transplanted into a host due to the effects of reperfusion injury or due to the effects of host immune cells, comprising administering to said host in need thereof an effective amount of a compound of claim 1, 17 or 24.

50. A method of reducing or preventing the death of mammalian sperm or eggs used in *in vitro* fertilization procedures, comprising contacting said sperm or egg with an effective amount of a compound of claim 1, 17 or 24.

51. A method of extending the lifespan of a mammalian or yeast cell line, comprising contacting said cell line with a compound of claim 1, 17 or 24.

52. The method of claim 51, wherein said contacting comprises including said compound in a cell growth medium.

53. A method of treating or ameliorating hair loss or premature graying of the hair in a mammal, comprising contacting the hair or hair follicles of the mammal in need thereof with a compound of claim 1, 17 or 24.

54. The method of claim 53, wherein hair loss is treated, and said hair loss is due to male-pattern baldness, radiation, chemotherapy or emotional stress.

55. A method of treating or ameliorating skin damage of a mammal due to exposure to high levels of radiation, heat or chemicals, comprising applying to the skin of the mammal in need thereof with a compound of claim 1, 17 or 24.

56. The method of claim 55, wherein said compound is applied as part of an ointment.

57. The method of claim 55, wherein said skin damage is due to acute over-exposure to the sun, and wherein said treating reduces blistering and peeling of the skin.

58. A method of treating or ameliorating sepsis or multi-organ failure in an animal, comprising administering to the animal in need thereof an effective amount of a compound of claim 1, 17 or 24.

59. A method of treating or ameliorating hepatitis in an animal, comprising administering to the animal in need thereof an effective amount of a compound of claim 1, 17 or 24.

60. A method of treating or ameliorating hereditary tyrosinemia type 1 in an animal, comprising administering to the animal in need thereof an effective amount of a compound of claim 1, 17 or 24.

61. A method of treating or ameliorating chronic alcohol ingestion induced buccal mucosa cell death in an animal, comprising administering to the animal in need thereof an effective amount of a compound of claim 1, 17 or 24.

62. A method of treating or ameliorating cell death in plants or flowers, comprising administering to the plants or flowers in need thereof an effective amount of a compound of claim 1, 17 or 24.

63. A method of treating or ameliorating radiation or ultraviolet-irradiation induced cell death in an animal, comprising administering to the animal in need thereof an effective amount of a compound of claim 1, 17 or 24.

64. A method of treating or ameliorating apoptotic death of bone marrow cells in myelodysplastic syndromes (MDS), comprising administering to the animal in need thereof an effective amount of a compound of claim 1, 17 or 24.

65. A method of treating or ameliorating apoptotic cell death in acute pancreatitis, comprising administering to the animal in need thereof an effective amount of a compound of claim 1, 17 or 24.

66. A method of treating or preventing the inflammatory response in psoriasis or inflammatory bowel disease, comprising administering to the animal in need thereof an effective amount of a compound of claim 1, 17 or 24.

67. A method of treating or ameliorating organ apoptosis after burn injury, comprising administering to the animal in need thereof an effective amount of a compound of claim 1, 17 or 24.

68. A method of treating or ameliorating small bowel tissue injury after intestinal ischemia-reperfusion, comprising administering to the animal in need thereof an effective amount of a compound of claim 1, 17 or 24.

69. A method of treating, ameliorating or preventing oral mucositis, gastrointestinal mucositis, bladder mucositis, proctitis, bone marrow cell death, skin cell death, or hair loss resulting from chemotherapy or radiation therapy of cancer in an animal, comprising administering to the animal in need thereof an effective amount of a compound of claim 1, 17 or 24.

70. The method of claim 69, wherein said compound is administered topically or orally.

71. The method of claim 70, wherein said compound is formulated as part of a mouthwash for the treatment, amelioration or prevention of oral mucositis.

72. The method of claim 70, wherein said compound is formulated as part of a slow release buccal lozenge.

73. The method of claim 70, wherein said compound is formulated as part of a suppository.

74. The method of claim 70, wherein said compound is formulated as part of a gel.

75. The method of claim 70, wherein said compound is administered through a bladder catheter for the treatment, amelioration or prevention of bladder mucositis.

76. The method of claim 70, wherein said compound is administered as part of an enema for the treatment, amelioration or prevention of proctitis.

77. The method of claim 70, wherein said compound is formulated as an oral formulation which is capable of coating the gastrointestinal surfaces for the treatment, amelioration or prevention of gastrointestinal mucositis.

78. The method of claim 69, wherein said gastrointestinal mucositis is esophageal mucositis, gastric mucositis, or intestinal mucositis.

79. The method of claim 69, wherein said compound is administered by i.v. injection for the treatment, amelioration or prevention of bone marrow cell death.

80. The method of claim 69, wherein said compound is administered as part of a pharmaceutical composition comprising a pharmaceutically acceptable carrier.

81. The method of claim 69, wherein said compound is administered after chemotherapy or radiation therapy of cancer in said animal.

82. The method of claim 69, wherein said compound is administered during chemotherapy or radiation therapy of cancer in said animal.

83. The method of claim 69, wherein said compound is administered prior to chemotherapy or radiation therapy of cancer in said animal.